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University of California Bulletin

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BULLETIN OF INFORMATION

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ANNOUNCEMENT OF

COURSES IN FORESTRY

1916-1917

SEPTEMBER, 1916

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UNIVERSITY OF CALIFORNIA
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1916-17. No. 4

IN THE TEN MILLION ACRE FOREST LABORATORY OF THE SIERRAS

UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE

BULLETIN OF INFORMATION

ANNOUNCEMENT OF

COURSES IN FORESTRY

1916-1917

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY

CALENDAR

1916

August 18, Friday–August 19, Saturday—Admission certificates issued to intrants; registration of new students, graduate and undergraduate, from 8:30 a.m. to 4:30 p.m. in California Hall.

August 21, Monday—Registration of old students, graduate and undergraduate, 8:30 a.m. to 5 p.m., in California Hall.

August 22, Tuesday—Instruction in all classes begins at 8:07 a.m.

November 30, Thursday–December 2, Saturday—Thanksgiving recess of three days.

December 12, Tuesday–December 22, Friday—Mid-year examinations.

December 23, Saturday–January 6, Saturday—Christmas vacation.

1917.

January 15, Monday—Registration of students for courses of the second half-year.

January 16, Tuesday—Instruction in all classes begins at 8:07 a.m.

March 23, Friday—Charter Day. Exercises in the Greek Theatre or Harmon Gymnasium.

April 30, Monday–May 12, Saturday—Annual examinations. Annual examinations for seniors begin Thursday, April 26.

May 14, Monday—Class Day.

May 16, Wednesday—The Fifty-fourth Commencement.

May 17, Thursday–August 8, Wednesday—Vacation of twelve weeks.

August 17, Friday–August 18, Saturday—Admission certificates issued to intrants; registration of new students, graduate and undergraduate, from 8:30 a.m. to 4:30 p.m., in California Hall.

August 20, Monday—Registration of old students, graduate and undergraduate, 8:30 a.m. to 5 p.m., in California Hall.

August 21, Tuesday—Instruction in all classes begins at 8:07 a.m.

November 29, Thursday–December 1, Saturday—Thanksgiving recess of three days.

December 11, Tuesday–December 21, Friday—Mid-year examinations.

A GIANT SEQUOIA ON THE UNIVERSITY'S WHITAKER FOREST IN THE SIERRAS

IN THE UNIVERSITY OF CALIFORNIA'S REDWOOD FOREST NEAR EUREKA

STAFF OF THE DIVISION OF FORESTRY

Benjamin Ide Wheeler, Ph.D., LL.D., President of the University.

Thomas Forsyth Hunt, D.Agr., D.Sc., Dean of the College of Agriculture; Professor of Agriculture; Director of Agricultural Experiment Station.

Walter Mulford, B.S.A., F.E., Professor of Forestry.

David Townsend Mason, M.S., M.F., Professor of Forestry.

Donald Bruce, B.A., M.F., Assistant Professor of Forestry.

Merritt B. Pratt, B.S., M.F., Assistant Professor of Forestry.

Woodbridge Metcalf, A.B., M.S.F., Assistant Professor of Forestry.

For the faculty in charge of the numerous required and recommended courses in other divisions and departments of the university, see the Announcement of Courses.

The University of California offers the following courses in forestry:

General Forestry

A four-year course designed to train students for the practice of the profession of forestry in its broader phases. Students who complete it will be prepared to take positions with the Federal and State forestry departments in the United States and in other countries, and with consulting foresters and owners of forest properties whose problems are not too closely specialized along engineering lines. The first two years of the course are occupied with a thorough training in the fundamental sciences, while the remainder is devoted to the application of these sciences to the several phases of forestry work. The detailed curriculum may be found on page 11.

Forest Utilization

A four-year course intended to prepare men for work as forest or logging engineers, with lumber companies, with consulting engineers, and in the government service, in certain important specialized fields. The course includes the same forestry subjects as the general forestry course, but is based on mechanics, physics, mathematics, and the like, in place of the biological sciences. The details of the course are given on page 14.

Five-Year Combined Course

This course is designed for students who wish to secure a training in general forestry strengthened along the lines of the forest utilization

STUDYING TREE GROWTH

LEARNING TO SCALE LOGS

course, and are willing to devote an additional year to that purpose. It contains all of the subjects in the former course and a very large proportion of those in the latter. The course is described in detail on page 15

Special Training for Work in the Orient, the Tropics, and South America

Because of the geographical location and the climatic conditions of California, the University of California is exceptionally well situated to provide special training for forestry work in the Orient, the Tropics, and South America. Students who wish to become trained as foresters for service in those parts of the world will find much of the work of these curricula specially adapted to their needs.

Short Course

This course, which occupies the first twelve weeks of the spring session, is designed for men employed as guards or rangers in the United States Forest Service or for men in the employ of lumber companies who desire such training as will enable them to carry on their work more efficiently. The details of the course may be found on page 29.

General Courses Not Designed for Professional Students

Two courses are offered during the regular university year and two in the university Summer Session for students who do not intend to become professional foresters, but who desire some knowledge of the aims and methods of the forester.

Correspondence Course

A correspondence course of ten lessons on lumber and its uses has been prepared, and may be had free of charge by anyone interested. Inquiries regarding this course should be addressed to the Division of Agricultural Education, University of California, Berkeley, California.

Practice Year

All students taking the four-year general forestry course, the forest utilization course, or the five-year combined course, are strongly urged to spend one year in actual work in the woods, preferably before completing the final year of the course. The experience so gained will not only be very useful in itself, but the value of the courses taken at the university will thereby be enhanced.

REQUIREMENTS FOR ADMISSION

Any person, 16 years of age or over, may enter either the four or five-year general forestry course as a regular student, without deficiency, if he is able to meet the following requirements either by entrance examination or the presentation of certificates from accredited schools.

ENGLISH, two years (Subject 1.)	6 units
MATHEMATICS, two years Plane Geometry (2)* and Elementary Algebra (3).	6
FOREIGN LANGUAGES, two years Any combination from the following: Latin (6),† Greek (8), French (15*a*), German (15*b*), Spanish (15c). (See also Subjects A and B under List of Preparatory Subjects.)	6
HISTORY, one year U. S. (5), or Ancient (10), or Medieval and Modern (13*a*), or English (13*b*).	3
SCIENCE, two years Physics (11)† and Chemistry (12*b*).†	6
OPTIONAL (from subjects 4–17 inclusive)	9
ELECTIVE	9
TOTAL	45 units

Among the elective units should be included, if possible, free-hand and geometrical drawing and trigonometry.

The candidate for admission must have chosen his preparatory subjects in such a way as to have a total of 12 units of "advanced subjects." Advanced subjects are as follows: $4a^1$, $4a^2$, 4*b*, 5, 7, 9, 11, 12 (excluding sciences given in the first and second years of the high school), 13*b*, 14, $15a^3$, $15a^4$, $15b^3$, $15b^4$, $15c^3$, $15c^4$.

* The numbers in parentheses refer to the matriculation subjects listed in the "Circular of Information" of the University of California; for example, 2 is plane geometry.

† The University does not offer courses equivalent to subject 6 (elementary Latin). This subject must be taken in the high school, if at all. Elementary physics and elementary chemistry are offered in the summer session of the University, but not in the fall or spring sessions.

For the four-year course in forest utilization the following entrance requirements must be met:

ENGLISH, two years ..... 6 units
(Subject 1.)

MATHEMATICS, four years 12
Plane Geometry (2),* Elem. Algebra (3), Algebraic Theory ($4a^1$), Algebraic Theory ($4a^2$) or Plane Analytic Geometry ($12a^3$), Solid Geometry ($4b$), Plane Trigonometry ($12a^2$).

FOREIGN LANGUAGE, two years 6
Any combination of the following:
Latin (6),† Greek (8), French ($15a$), German ($15b$), Spanish ($15c$).
(See also Subjects A and B under List of Preparatory Subjects.)

HISTORY, one year 3
U. S. (5), or Ancient (10), or Medieval and Modern ($13a$), or English ($13b$).

SCIENCE, two years 6
Physics (11)† and Chemistry ($12b$).†

DRAWING, two years 6
Freehand (16) and Geometrical (17).

ADDITIONAL 6
Any combination of the following:
Additional foreign language (6, 7, 8, 9, 15).
Advanced English (14).

TOTAL ..... 45 units

SURPLUS MATRICULATION CREDIT

Students who bring to the University any matriculation credits in excess of the requirements for matriculation must pass an examination in the University in each subject covered by such credits before these may be counted as canceling any portion of the one hundred and twenty-four or more units required for graduation. In lieu of such examination for university credit in a given matriculation subject, the Faculty may accept as sufficient evidence of proficiency, a thoroughly satisfactory record (at least second grade) in higher work in the same subject, or in a closely

* The numbers in parentheses refer to the matriculation subjects listed in the "Circular of Information" of the University of California; for example, 2 is plane geometry.

† The University does not offer courses equivalent to subject 6 (elementary Latin). This subject must be taken in the high school, if at all. Elementary physics and elementary chemistry are offered in the summer session of the University, but not in the fall or spring sessions.

A BY-PRODUCT OF THE FOREST SCHOOL CAMP IN THE SIERRAS

"GUNNING" A BIG REDWOOD

related subject, taken in the University. The preparatory subjects in which the university credits may be acquired are as follows: 4, 7, 8, 9, 12a^1, 12a^2, 12a^3, 15, 16, and 17.

A surplus matriculation credit in the foregoing list of subjects, or in other subjects, which may be granted upon recommendation or credentials, without examination, may be used to reduce the number of units in these specific subjects prescribed, in the University, but not to reduce the total number of units required for the degree.

CURRICULA AND REQUIREMENTS FOR GRADUATION

The numbers opposite the various courses show the credit value in units of those courses.

Four-Year Course in General Forestry

The following curriculum is recommended:

Freshman Year

	First Half-year		Second Half-year
Botany 2, General Botany	3	Botany 3, General Botany	3
Chemistry 1A, Inorganic Chemistry	5	Chemistry 1B, Qualitative Analysis	5
Hygiene 1	2	Drawing CD, Mechanical Drawing	2
Mathematics 1 or C	5–2	Military 1B	1
Military 1A, 2A	1½	Pathology 1, Bacteriology	4
Physical Education 1A	½	Physical Education 1B	½
Elective	2–5	Elective	3
	19		18½

Sophomore Year

	First Half-year		Second Half-year
Agr. Chemistry 1, 2	5	Civil Engineering 1B–D, Surveying	3
Civil Engineering 1A–C, Surveying	3	Genetics 1, Principles of Breeding Plants and Animals	4
Geology 1A, Gen. Geology	3	Landscape Gardening 1, Plant Propagation	4
Military 1A, 2B	1½	Military 1B	1
Physical Education 1C	½	Physical Education 1D	½
Zoology 1A, Gen. Zoology	4	Soil Technology 1	4
Elective	2	Elective	3
	19		19½

Summer following Sophomore year: Civil Engineering 3A. Surveying, 4 weeks. 3 units.

OVERHEAD SYSTEM OF LOADING

LOADING REDWOOD LOGS WITH DONKEY ENGINE

Junior Year

	First Half-year		Second Half-year
Botany 104A, Forest Botany	3	Economics 113A, Labor Problems	2
Economics 14A, Accounting, or		Forestry 101, Mensuration	3
Plant Pathology 120	4–3	Forestry 104, Silviculture	5
Economics 124, Business Organization	3	Forestry 110, Protection	3
Mathematics 3A	3	Jurisprudence 18B, Commercial Law	2
Forestry 114, Wood Technology	3		16
Jurisprudence 18A, Commercial Law	2		
	17–16		

Summer following Junior year: Forestry 99. Practice in Mensuration, Silviculture, Management and Logging, 11 weeks. 6 units.

Senior Year

	First Half-year		Second Half-year
Entomology 114, Forest Insects	3	Forestry 115, Logging	3
Forestry 106, Artificial Reproduction	2	Forestry 118, Forest Improvements	3
Forestry 108, Timber Trees	3	Forestry 120, Finance and Organization	5
Forestry 112, Forest Utilization	3	Forestry 122, Administration and Policy	4
Elective	5	Hygiene 6, Industrial Hygiene	2
	16		17

While the full programme as above listed is strongly recommended for all students seeking a professional training, the actual requirements for graduation are as follows:

(*a*) All subjects included in the programme of the freshman and sophomore years, summer course Civil Engineering 3A and Forestry 99, Botany 104A, and 5 units of economics must be completed.

(*b*) Including matriculation units, all students must complete as soon as possible, and before graduation, English, 12 units, and pass an examination in English expression, known as subject A; mathematics, including trigonometry, 12 units; foreign language, 12 units, and pass an examination in reading knowledge of a foreign language known as subject B; also history or economics, 9 units. If the student has entered with the minimum matriculation requirements of 6 units each of English, mathematics, and foreign language, and 3 units of history, he must complete in the university 6 units each of English, mathematics, foreign language and economics. These subjects he will ordinarily take during his freshman and sophomore years.

(*c*) Each student is required during his junior and senior years to complete 60 units of work, as shown below. A major course is one numbered 100 or over.

Major courses in forestry	14
Major courses correlated with forestry	10
Major courses in any sub-departments of agriculture	12
Optional	24

The work of the junior and senior years is carried on under the direction of the head of the forestry division, and all junior and senior study lists must be approved by him before presentation for signature to the Dean.

Four-Year Course in Forest Utilization

Freshman Year

	First Half-year		Second Half-year
Subject A		C. E. 1B–D, Surveying	3
C. E. 1A–C, Surveying	3	Chemistry 1B	5
Chemistry 1A	5	Mathematics 3B	3
Hygiene 1	2	Military 1B	1
Mathematics 3A	3	Physical Education 1B	½
Military 1A, 2A	1½	Physics 1B	3
Physical Education 1A	½	Elective	1
Physics 1A	3		16½
	18		

Summer following Freshman year: Civil Engineering 3A. Surveying, 4 weeks. 3 units.

Sophomore Year

	First Half-year		Second Half-year
Drawing 2A, Descriptive Geometry	3	Economics 14B, Accounting	3
Economics 14A, Accounting	3	Forestry 110, Protection	3
Mathematics 4A	3	*Hygiene 6, Industrial Hygiene	2
Mechanics 1A, Steam Engineering	3	Mathematics 4B	3
Mechanics 3A, Shop	2	Mechanics 1B, Electrical Engineering	3
Military 1A, 2B	1½	Military 1B	1
Physical Education 1C	½	Physical Education 1D	½
Physics 2C	3	Physics 2D	3
	19		18½

* Asterisks indicate courses for which substitutions may be permitted with the approval of the head of the division. All courses not asterisked are required for graduation.

Junior Year

	First Half-year		Second Half-year
C. E. 102AB, Railroad Surveying	3	C. E. 108B, Strength of Materials	2
C. E. 108A, Strength of Materials	3	*Economics 114E, Cost Keeping	2
*Economics 105, Industrial Efficiency	2	Forestry 101, Mensuration	3
*Economics 124, Business Organization	2	Forestry 104, Silviculture	5
Forestry 114, Wood Technology	3	Mechanics 102B, Engineering Mechanics	3
Mechanics 9A, Shop	2	Elective	3
Mechanics 102A, Engineering Mechanics	3		18
	18		

Summer following Junior year: Forestry 99. Practice in Mensuration, Silviculture, Management and Logging, 11 weeks. 6 units.

Senior Year

	First Half-year		Second Half-year
*C. E. 108C, Testing Lab	2	*C. E. 116, Engineering Contracts	1
*Forestry 106, Artificial Reproduction	2	Forestry 115, Logging	3
Forestry 108, Timber Trees	3	Forestry 118, Forest Improvements	3
Forestry 112, Forest Utilization	3	Forestry 120, Finance and Organization	5
*Geology 1A	3	Forestry 122, Administration and Policy	4
*Jurisprudence 18A, Commercial Law	2	*Jurisprudence 18B, Commercial Law	2
Elective	3		18
	18		

FIVE-YEAR GENERAL FORESTRY COURSE

The following curriculum is recommended:

First and second years same as in four-year general forestry course.

Third Year

	First Half-year		Second Half-year
Economics 14A, Accounting	3	Economics 14B, Accounting	3
Economics 105, Industrial Efficiency	2	Hygiene 6, Industrial Hygiene	2
Economics 124, Business Organization	2	Jurisprudence 18B, Commercial Law	2
Jurisprudence 18A, Commercial Law	2	Mathematics 3B	3
Mathematics 3A	3	Mechanics 9A, Shop	2
Mechanics 8A, Shop	2	Physics 1B	3
Physics 1A	3	Elective	3
	17		18

EXTERIOR OF A REDWOOD MILL

MONORAIL SYSTEM OF HANDLING LUMBER

Fourth Year

	First Half-year		Second Half-year
Botany 104A, Forest Botany	3	Forestry 101, Mensuration	3
Forestry 114, Wood Technology	3	Forestry 104, Silviculture	5
Mathematics 4A	3	Forestry 110, Protection	3
Mechanics 1A, Steam Engineering	3	Mathematics 4B	3
Physics 2C	3	Physics 2D	3
Elective	2		
	17		17

Summer following fourth year, Forestry 99. Practice in Mensuration, Silviculture, Management and Logging, 11 weeks. 6 units.

Fifth Year

	First Half-year		Second Half-year
C. E. 102AB, Railroad Surveying	3	Entomology 114, Forest Insects	3
Forestry 106, Artificial Reproduction	2	or	
Forestry 108, Timber Trees	3	C. E. 116, Engineering Contracts	1
Forestry 112, Forest Utilization	3	and	3
Mechanics 102A, Engineering Mechanics	3	Economics 114E, Cost Keeping	2
Elective	2	Forestry 115, Logging	3
	16	Forestry 118, Forest Improvements	3
		Forestry 120, Finance and Organization	5
		Forestry 122, Administration and Policy	4
			18

This arrangement of courses is strongly recommended. The actual requirements for graduation are the same as in the four-year course in general forestry.

Degree

The degree Bachelor of Science is conferred upon completion of any one of the above courses.

SUMMER CAMP

Special emphasis is placed on field work throughout each of these courses. A summer camp is conducted during the summer preceding the senior year, lasting eleven weeks, at which a thorough drill in methods of timber estimating, forest mapping, scaling, and the study of tree growth are given. Considerable time is devoted to a detailed analysis of a logging operation, to field work in silviculture and to the collection of the data necessary for a forest working plan. The 1915 camp was at Quincy, the headquarters of the Plumas National Forest, one of the leading timber-producing forests of the state. The location of future camps will be either on some National Forest in the Sierra Nevada Mountains or in the redwood region.

The university furnishes tents, cots, mattresses, tables, chairs and lamps. Students must supply themselves with bedding. The camp commissary will be managed by a committee elected by the students.

Attendance at the summer surveying camp in the Santa Cruz Mountains is also required. This is the regular surveying field work of the civil engineers and includes practice in running lines with levels and in making topographic surveys by transit and stadia methods and with plane tables, etc. It is taken in the summer after the freshman or sophomore year, and lasts four weeks. Here also the university provides all necessary camp equipment other than bedding.

In addition to the summer work, a large number of field trips are taken in connection with the courses held at Berkeley. The region around San Francisco Bay lends itself admirably to a number of different lines of field work.

GRADUATE WORK

A student who enters as a graduate after having completed the equivalent of one of the undergraduate forestry curricula as given at the University of California, should be able to complete the work for the master's degree in one year; if he lacks much of the undergraduate work, two or more years may be required. For the doctor's degree, three years of graduate work is ordinarily required.

Research

The opportunities for immediately useful research along forestry lines in California are very great and the field is almost untouched. Among the opportunities are the widely varied problems in logging and other forest engineering lines; efforts in the broad field of wood technology and wood utilization, to find the best woods for various purposes and the best means of utilizing by-products; the application of scientific management to various phases of forest administration, and other problems connected with forest management; and a wide range of silvicultural questions.

GENERAL INFORMATION

Aims and Facilities

The forest area of California, about twenty-eight million acres in extent, is approximately equal to its area of farm land. These forests have an estimated stand of 380 billion board feet of timber. Owing to the high precipitation and long growing season, California timber grows with unusual rapidity and to unusual size, thus offering exceptional opportunities for the practice of forestry in the production of continuous crops of timber. Over two-thirds of the forest area of the state, located in the National Forests, is now devoted to the permanent production of timber; most of the remainder of the forested area, now principally in private ownership, is suited better to timber production than to any other purpose, and will doubtless be devoted to that end when economic conditions make it possible. The lumber industry is already highly developed, and about one and one-fourth billion feet of lumber are cut annually. At this rate present virgin supplies would not be exhausted for three hundred years, making no allowance for growth. This enormous virgin supply will safely permit the great expansion of the industry which is inevitable as the nation makes increasingly greater demands on the forests of California, due to the exhaustion of supplies elsewhere.

The National Forests of California and of other western states require the services of trained men for their proper management; each year the demand increases for more careful training of rangers and other officers needed for administration, protection, and development. The lumber industry, as the pressure of modern business increases in intensity, recognizes more and more the need for specially trained men in logging, milling, selling, and administrative departments. Aside from these two most important fields, there are a number of other specialized lines for which training is needed. A thorough grounding in the underlying principles of these fields is given, with special emphasis on the application of the principles to western conditions.

The eighteen national forests of the state, over twenty million acres in area, are a great laboratory available for forestry work. The redwood forest region, stretching north along the coast from San Francisco Bay, a region not included in the National Forests, offers a very important and accessible field for study. In both these regions a wide variety of forest work is in progress on a very large scale, including extensive logging operations. The summer climate of the Sierras is particularly favorable for field work, as practically no time is lost on account of rainy weather.

The district headquarters of the United States Forest Service are in San Francisco, reached in less than an hour from the campus, and

IN A REDWOOD MILL

CONSERVATIVE LUMBERING IN THE SIERRAS

the forest officers are co-operating cordially with the university. A course of special lectures at the university by Forest Service officers (see p. 22) will enable the student body to keep in close touch with new developments in forestry. In San Francisco are also the headquarters of many prominent lumber companies of the Pacific Coast and a large number of manufacturing plants which use a great variety of forest products. The university is in close touch with the State Forester's office. Near the campus are several thousand acres of interesting plantations of both hardwoods and conifers, which are probably among the largest and oldest in the western United States.

The Division of Forestry is supplied with instruments, lantern slides, and other equipment necessary for the satisfactory conduct of the work. A good forestry library is housed in the general university library. The Division of Forestry will have extensive quarters in the new Hilgard Hall, now being constructed. These quarters will include a general forestry laboratory, a forest utilization laboratory, two wood technology laboratories, drafting and blue-print rooms, herbarium room, five rooms for research, instrument room, two supply rooms, and a suite of six offices. Much of the engineering work is carried on in the well-equipped shops and laboratories of the Department of Mechanical and Electrical Engineering and the Department of Civil Engineering. The equipment for timber testing is particularly complete.

A tract of 320 acres of forest land in the southern Sierras was given to the university by Horace Whitaker for forestry purposes. This tract, known as Whitaker's Forest, contains an excellent stand of sequoias (*Sequoia gigantea*), and is being used for forestry investigations. The university owns also about five thousand acres of redwood timberland in Humboldt County, given by Mrs. Hooper as an endowment for the George Williams Hooper Foundation for Medical Research.

Expenses

Tuition is free to residents of the state. Non-residents of California are charged a tuition of ten dollars each half-year. The following incidental expenses are to be met:

Gymnasium and Infirmary fees.—The gymnasium fee is $2 per half-year and the infirmary fee is $3 per half-year; both are payable by every student, graduate or undergraduate, before his study card is filed. These fees entitle students to gymnasium and hospital privileges, and are not remitted, in whole or in part, for those who may not desire to make use of these privileges. Gymnasium privileges comprise, besides the use of the gymnasium, the use of the tennis courts, swimming pool, baths, lockers, wash rooms, etc. The infirmary fee entitles the students, in case

of illness, to hospital care (cost of surgical operations not included), dispensary treatment, and consultation. One-half of the amount of these fees is returned to students who leave the university during the first half-year before September 1, or during the second half-year before February 1.

Laboratory Fees.—In the laboratories a charge is made for materials actually used. This charge, for students in the elementary laboratories, amounts to from $5 to $30 per annum.

Military Uniforms.—Every able-bodied male undergraduate student is required to take military exercise during his first two years in the university. A sum sufficient to cover the cost of the uniform, about $20, must be deposited with the Comptroller of the University immediately after admission. Uniforms made by any other than the authorized manufacturer will not be accepted.

Summer Camp, Civil Engineering 3A (Surveying).—A laboratory fee of $20 is charged. In addition, each student is assessed for a proportionate share of the running expenses of the camp; the total expense of this, including fare to and from Berkeley, is estimated at $28.

Summer Camp, Forestry 99.—No laboratory fee is charged. The only expense to the student is for travel to and from Berkeley, and for a proportionate share of the running expenses of the camp. These are estimated at $25 a month (including board).

Board and lodging may be obtained in private families in or near Berkeley and Oakland at from $25 to $40 a month. They may occasionally be had in return for various personal services in the household. The cost of board and lodging in student's boarding clubs ranges from $15 to $30 a month. A few students board themselves for as low as $15 a month, but this plan of living is not generally to be recommended.

The ordinary yearly expenses of a student, including personal expenses, need not exceed $425.

Summer Work

Summer work in the woods can usually be obtained with lumber companies, consulting foresters, the state forestry department, or the United States Forest Service. All students are strongly urged to utilize all available vacation periods in this manner.

Forestry Club

An active Forestry Club is conducted by students in forestry at the university. Fortnightly meetings are held at which addresses are given by prominent foresters, lumbermen and experts in allied fields.

The proximity of San Francisco has made the club exceptionally fortunate in being able to secure men of prominence, and the meetings have been a valuable addition to the professional courses. The club also holds, occasionally, purely social meetings and arranges short trips to neighboring points of scenic beauty and interest.

Correspondence

All correspondence concerning admission and classification should be addressed to The Recorder of the Faculties, University of California, Berkeley, California. For other information concerning forestry communications may be addressed to the Division of Forestry, College of Agriculture, University of California, Berkeley, California.

All Students Report to the Division of Forestry

All freshmen and sophomores who are planning to take forestry as their major subject are urged to call at the office of the Division of Forestry sometime during the first week of each session, as early as possible after registration with the Recorder of the Faculties.

DESCRIPTION OF INDIVIDUAL COURSES

Forestry

1. Elements of Forestry. Professor Mulford.

Lectures designed to present a general picture of the relations of forestry to the every-day life of a nation. Among the topics discussed will be: the influence of forests upon water supply, climate, soil, and public health; the products of the forest; the life story of the tree and the forest; the general principles of forestry practice; protection of the forest from fire and other enemies; present organization of forestry work in the United States and Europe. Several lectures on fish and game protection will be given by members of the staff of the California Fish and Game Commission.

3 hrs., second half-year, M W F, 9.

2. Forestry Methods. Assistant Professor Metcalf.

A lecture, field, and laboratory course which gives elementary training in the following branches: identification of common woods used by the carpenter and the cabinet maker; identification of the principal timber trees of the Pacific Coast; uses of various kinds of wood; tree seeds; forest nurseries; starting forests by direct seeding and by planting; measuring the amount of timber, both felled and standing; determination of the value of standing timber.

5 hrs., first half-year; 3 units. Lectures, M W, 9; laboratory, Th, 1–4.

EXTENSIVE FOREST PLANTATIONS ON THE BERKELEY HILLS

NATURAL REPRODUCTION OF WESTERN YELLOW PINE ON THE STANISLAUS NATIONAL FOREST

99. Practice in Forestry.

Assistant Professor Bruce in charge; Professors Mulford and Mason, and Assistant Professor Pratt.

Practice in scaling and estimating timber and the study of its growth; timber survey of a large tract; detailed study of a logging and milling operation; field instruction in silviculture; collection of data for a working plan.

Eleven weeks, summer camp; 6 units. To be held in the pine region of the Sierra or in the redwood region, near large logging operations.

Woodsmanship.

While in camp for course 99, instruction in woodsmanship will be given. Students who make forestry their major subject will be required to become reasonably proficient in woodsmanship. No credit.

101. Forest Mensuration. Assistant Professor Bruce.

The measurement of saw logs and other manufactured products, of standing timber, and of the growth of trees and stands.

6 hrs., second half-year; 3 units. Lectures, M W, 11; laboratory, Tu, 1–5.

104. Silviculture: Forest Ecology and Natural Reproduction.

Professor Mulford.

The influence of site on the forest and of the forest on site; the behavior of trees as members of a forest community; forest description; the methods of reproducing the forest without planting or sowing; the care of the crop during its growth; timber sale marking.

7 hrs., second half-year; 5 units. Lectures, Tu Th F S, 8; field work, S, 9–12.

106. Silviculture: Artificial Reproduction.

Assistant Professor Metcalf.

Tree seeds; direct seeding; the forest nursery; forest planting; woodlot and windbreak planting; fixation of sand dunes.

5 hrs., first half-year; 2 units. Lecture, F, 10; laboratory or field work, Tu, 1–5.

108. Timber Trees and Forest Regions. Assistant Professor METCALF.

Brief survey of the forest regions of the world; detailed account of the forest regions of the United States and Canada; the distribution, importance, and silvical characteristics of the leading timber trees of the United States and Canada, and the identification of such of these as do not grow in California. (The identification of California trees is given in Botany 104A.)

6 hrs., first half-year; 3 units. Lectures, Tu Th, 8; laboratory, S, 8–12. Open to students with a major in forestry or by permission.

110. Forest Protection. Professor MASON.

The protection of forests from fire, trespass, fungi, and other enemies.

6 hrs., second half-year; 3 units. Lectures, Tu Th, 10; laboratory, W, 1–5.

112. Forest Utilization. Assistant Professor PRATT.

The manufacture, seasoning, grading and care of rough and finished lumber; the principal industrial uses of lumber; minor wood-using industries; utilization of products other than wood, such as forage, fish and game.

6 hrs., first half-year; 3 units. Lectures, Tu Th, 9; laboratory, F, 1–5.

114. Wood Technology. Assistant Professor PRATT.

Identification of economic woods; physical, chemical and mechanical properties of wood; utilization of waste; technical forest products; wood preservation; paper pulp; destructive distillates.

6 hrs., first half-year; 3 units. Lectures, M W, 11; laboratory, W, 1–5.

115. Logging. Assistant Professor BRUCE.

The manufacture and transportation of saw logs from stump to mill.

6 hrs., second half-year; 3 units. Lectures, M W, 9; laboratory, Th, 1–5.

118. Forest Improvements. Assistant Professor BRUCE.

The construction and maintenance of forest trails, roads, bridges, and telephone lines.

6 hrs., second half-year; 3 units. Lectures, Tu Th, 9; laboratory, F, 1–5.

120. Forest Finance and Organization. Professor MASON.

Forest valuation; working plans; regulation of yield.

7 hrs., second half-year; 5 units. Lectures, Tu Th F S, 8; laboratory, S, 9–12.

122. Forest Administration and Policy. Professor Mason.

Personnel and organization of the forest staff; forest taxation; other forest laws; the relations of state and individual to forestry; historical development of forestry.

7 hrs., second half-year; 4 units. Lectures, M W F, 10; laboratory, M, 1–5.

128. Conference. Assistant Professor Pratt.

Round-table discussions of forestry problems; individual topics of study will be assigned.

3 hrs., first half-year, to be arranged. Open only to students with a major in forestry.

202A–202B. Research.

Professors Mulford and Mason, and Assistant Professors Bruce, Pratt and Metcalf.

Individual advanced study and research in silviculture, forest management, forest engineering, forest utilization, wood technology, forest protection, or forest policy.

3 to 6 units, throughout the year, to be arranged.

Allied Subjects

For full description of the following courses, see the annual Announcement of courses:

Agricultural Chemistry 1, 2, Agronomy 108, Botany 2, 3, 104A, Chemistry 1A–1B, Civil Engineering 1A–1B, 1C–1D, 3A, 102AB, 108A–108B, 108C, 116, Drawing CD, 2A, Economics 14A–14B, 105, 113A, 114E, 124, 125, Entomology 114, Genetics 1, Geology 1A, Hygiene 1, 6, Jurisprudence 18A–18B, Landscape Gardening 1, 108, Mathematics C, 1, 3A–3B, 4A–4B, Mechanical Engineering 1A, 1B, 8A, 9A, 102A–102B, Military Science 1A–1B, 2A, 2B, Pathology 1, Physical Education 1ABCD, Physics 1A–1B, 2C–2D, Plant Pathology 120, Soil Technology 1, Zoology 1A.

SHORT COURSE

Object.

The man who works in the woods, whether employed by a lumber company or by the United States Forest Service as a guard or ranger, often realizes with regret that it is impossible for him to keep thoroughly in touch with the progress of his profession. However thoroughly he may know the practical details of his particular job, he knows but vaguely of the new methods being constantly developed throughout the country which would be of value to him. He may feel, too, the lack of the broad outlook which would enable him to appreciate the full significance of some of his duties. It is for such men that the short course in forestry has been planned.

Course of Study

The courses offered are as follows:

Hours per week

Subject—	Lectures	Laboratory or Field Work	Periods
Surveying and Mapping	2	6	4
Forest Mensuration (Forestry 101)	2	3	3
Forest Protection (Forestry 110)	2	3	3
Silviculture	1	3	2
Forest Administration (Forestry 122)	3	3	4
Forest Improvements (Forestry 118)	2	3	3
Grazing	2	3	3
Logging (Forestry 115)	2	3	3
Lectures by Forest Service Officers	1	..	1

Of these each student may select the courses which he feels will be most beneficial to him. Nineteen periods is the maximum number that can be satisfactorily handled and the average student will accomplish more if he attempts only sixteen.

The courses followed by a number (as Forestry 101) are the same as those taken by the regular students. These courses are so arranged that the material of greatest importance to short-course men is covered during the twelve weeks of the short course. Unnumbered courses are special courses for short course students.

Time

The next short course will commence January 15, 1917, and close April 7.

Admission

The only requirements for admission are that the applicant be over eighteen years of age and shall have had experience in woods work satisfactory to the Division of Forestry.

Expenses

No tuition or other fees are charged, even to non-residents. The total expenses for books and stationery do not exceed $15. For living expenses in Berkeley, see page 17.

Forestry Club

Short course students will be welcomed at all meetings of the Forestry Club and encouraged to take active part therein.

Co-operation with the Forest Service

The district officers of the United States Forest Service have taken an active interest in the establishment of this course and have been consulted freely as to all its details. The lecture course to be given by members of the district office will be of particular value to the forest ranger in putting him in touch with the latest developments of the Forest Service policy along every line.

Description of Courses

A description of the numbered courses will be found on pages 23–27. The four unnumbered courses are as follows:

Surveying and Mapping.—The use of transit, compass, plane-table, hand level, barometer, and other instruments. Metes and bounds surveys, calculation of closures and of areas. Topographic surveys by various methods. Retracement and subdivision of public land surveys.

Silviculture.—Methods of cutting timber to insure a second crop. Care of the crop during its growth. Timber sale marking. Factors affecting growth of timber. Influence of the forest on climate and stream-flow.

Grazing.—Description, occurrence and uses of the principal forage plants of California; poisonous plants; range improvement and management; range surveys; grazing working plans; National Forest administration of the range.

Special Lectures by Forest Service Officers.—The topics discussed will include timber sales, fire protection, insect control, tree disease control, personnel policy, grazing, forest homesteads, extensive land classification, water power and telephone problems.

UNIVERSITY OF ILLINOIS-URBANA
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The Annual Announcements of the Medical School, the Colleges of Dentistry, Law, and Pharmacy.

The President's Annual Report.

The Prospectus of the College of Agriculture.